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SMT and HAN Technical Orientation for Competitive Retailers

January 7, 2010

AGENDA

- Objectives

- Overview of the Smart Meter Texas (SMT) Solution

- Considerations for REP Entity / DUNS / Administration

- FTPS Preparation for Usage

- M1 Ad hoc Usage API

- HAN API

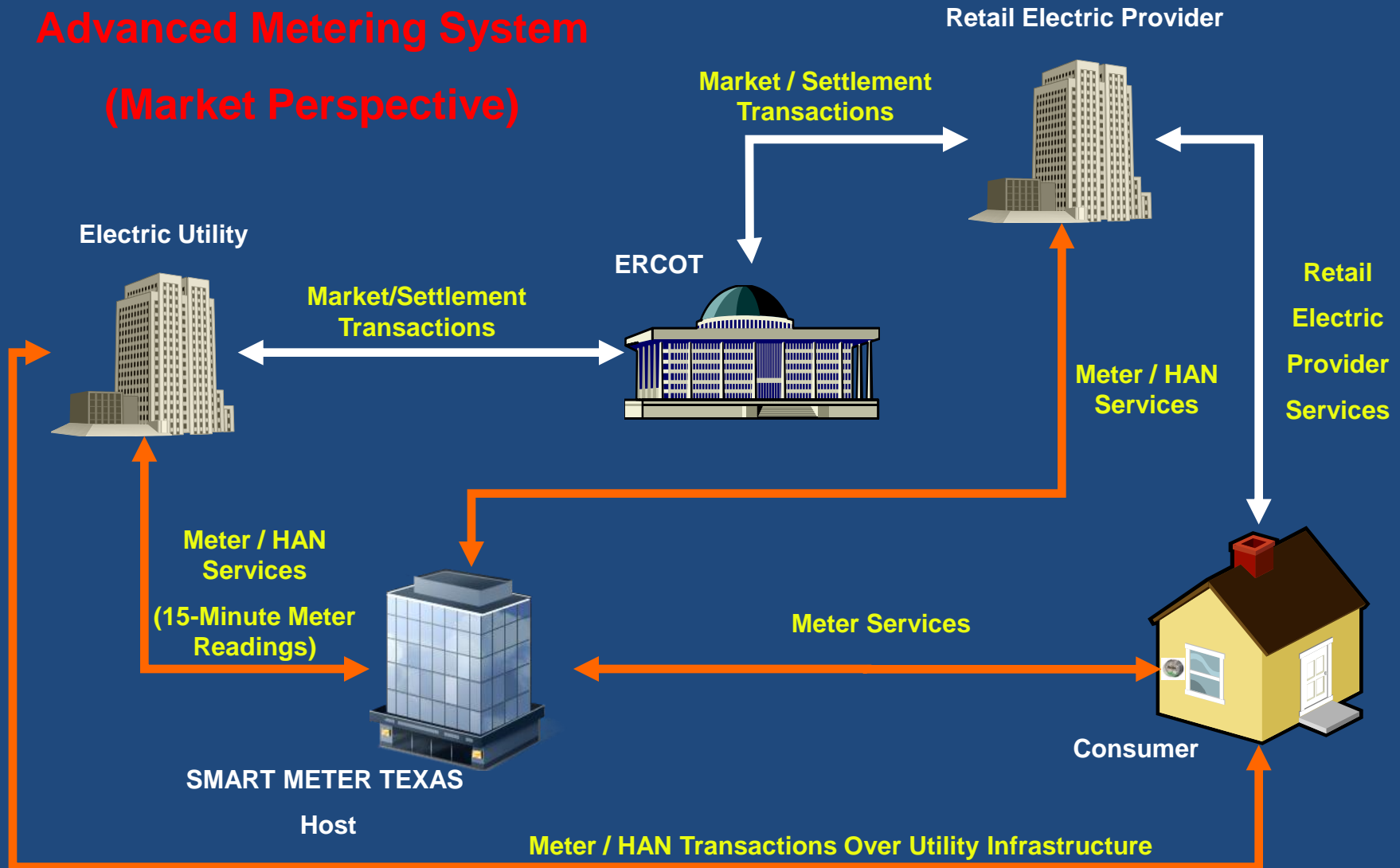- Schedule for REP Roll-out

- Q&A

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— TEXAS —

Overview of the Smart Meter Texas (SMT) Solution

Overview of the Smart Meter Texas (SMT) Solution

Advanced Metering System

(Market Perspective)

Retail Electric Provider

Market / Settlement Transactions

Electric Utility

Market/Settlement Transactions

ERCOT

Meter / HAN Services

Retail Electric Provider Services

Meter / HAN Services

(15-Minute Meter Readings)

Meter Services

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Host

Consumer

Meter / HAN Transactions Over Utility Infrastructure

Overview of the Smart Meter Texas (SMT) Solution

Overview of the Smart Meter Texas (SMT) Solution

Overview of the Smart Meter Texas (SMT) Solution

Meter Interval Usage

HAN Messages

Meter Attributes

Premise

REP of Record

Smart Meters

Demand Response

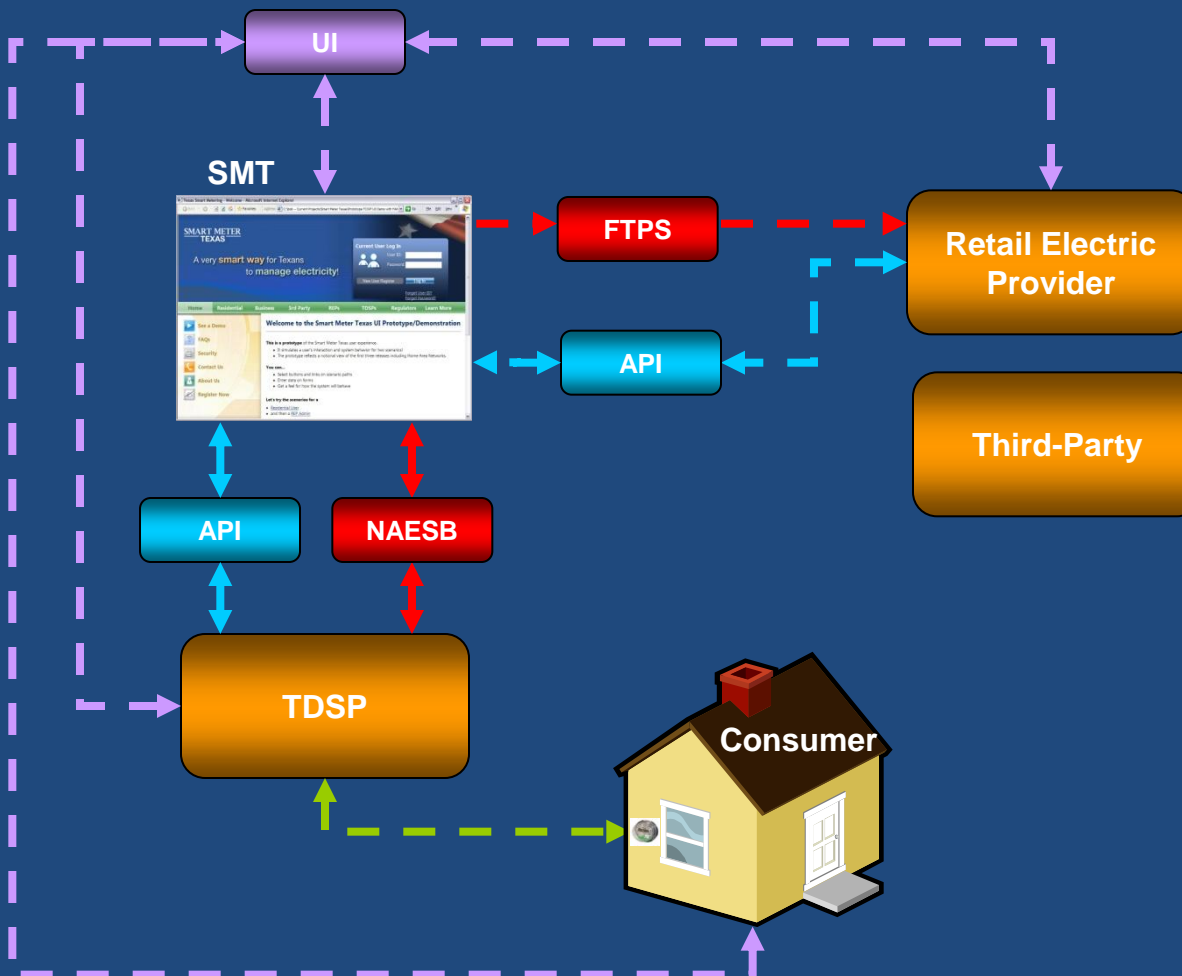**Settlement**

Pricing

Text Messaging

Usage Display

Overview of the Smart Meter Texas (SMT) Solution

SMT (M1-M3, HAN) – Baseline 1/31/2010

Overview of the Smart Meter Texas (SMT) Solution

SMT M Functions – Baseline 1/31/2010

Function	Retail Electric Provider		Customer		TDSP		SMT	
	API	UI	API	UI	API	UI	API	UI
Manage Personal Profile		X		X		X		X
Manage Company Profile		X		Non-Res		X		X
Manage User Access		X		Non-Res		X		X
Attach ESIIDs				X				
Detach ESIIDs				X		X		X
Retrieve Daily ROR Usage Files		ROR						
Retrieve 15-min Intervals	ROR	ROR		X		X		X
Retrieve Daily Usage	ROR	ROR		X		X		X
Retrieve Version Reports		ROR				X		X
Set Broadcast Messages								X

Overview of the Smart Meter Texas (SMT) Solution

SMT HAN Functions – Baseline 1/31/2010

Message Type	Retail Electric Provider		Customer		TDSP		SMT	
	API	UI	API	UI	API	UI	API	UI
Provision HAN Device	X	X				X		X
De-Provision HAN Device	X	X				X		X
Load Control	X							
Pricing	X							
Text	X							

Overview of the Smart Meter Texas (SMT) Solution

SMT Interfaces:

API/FTP interfaces	Initial draft Specification	Final Specification
Extract of LSE files from SMT FTP site (interval & register reads)	12/15/09	1/15/10
Request for Ad-hoc usage via web service calls to SMT	12/15/09	1/15/10
Extract of LSE/CSV ad-hoc usage response files from SMT FTP site and Portal web link	12/15/09	1/15/10

HAN Interfaces:

API interfaces	Initial draft Specification	Final Specification
Provisioning / De-provisioning	12/15/09	1/15/10
Smart Energy Profile 1.0 messaging	12/15/09	1/15/10

Overview of the Smart Meter Texas (SMT) Solution

- The following represents the order of actions to fully integrate REPs into SMT:

1. Register via the SMT portal
   - Available to all REPS 2-1-2010
2. Complete the SMT FTPS Setup
   - Signup as described on the AMIT website**
3. Complete the SMT API Setup (optional)
   - Signup as described on the AMIT website**

** http://www.puc.state.tx.us/electric/projects/34610/34610.cfm

Overview of the Smart Meter Texas (SMT) Solution

SMT for Retail Electric Providers

Function	Registers for the SMT Portal			Existing TDSP FTP	Completes SMT FTP Setup	Completes SMT API Setup
	Submit Request Online	View Results Online	Export / Download		Export / Download	Submit Request via API
Manage Personal Profile	X	X				
Manage Company Profile	X	X				
Manage User Access	X	X				
View Broadcast Messages	X	X				
Retrieve Daily ROR Usage Files (a)				X	X	
Retrieve 15-min Intervals (1 ESIID for no more than 40 days at a time)	X	X	X		X	(b)
Retrieve 15-min Intervals (Multiple ESIIDs for up to 48 months)	(a)				X	(b)

(a) SMT Portal will allow this request. However, result can only be retrieved from the FTPS site.
(b) Reports requested via API can only be retrieved from the SMT FTPS site.

SMT for Retail Electric Providers

Function	Registers for the SMT Portal			Existing TDSP FTP	Completes SMT FTP Setup	Completes SMT API Setup
	Submit Request Online	View Results Online	Export / Download		Export / Download	Submit Request via API
Retrieve Daily Usage (1 ESIID for no more than 1200 days)	X	X	X		X	(b)
Retrieve Daily Usage (Multiple ESIIDs for up to 48 months)	(a)				X	(b)
Retrieve Version Reports	X	X	X			
Provision / Deprovision HAN Devices	X	X				X
Send HAN Messages						X
Retrieve HAN Messaging Log	(a)				X	

(a) SMT Portal will allow this request. However, result can only be retrieved from the SMT FTP site.
(b) Reports requested via API can only be retrieved from the SMT FTP site.

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Considerations for REP Entity / DUNS
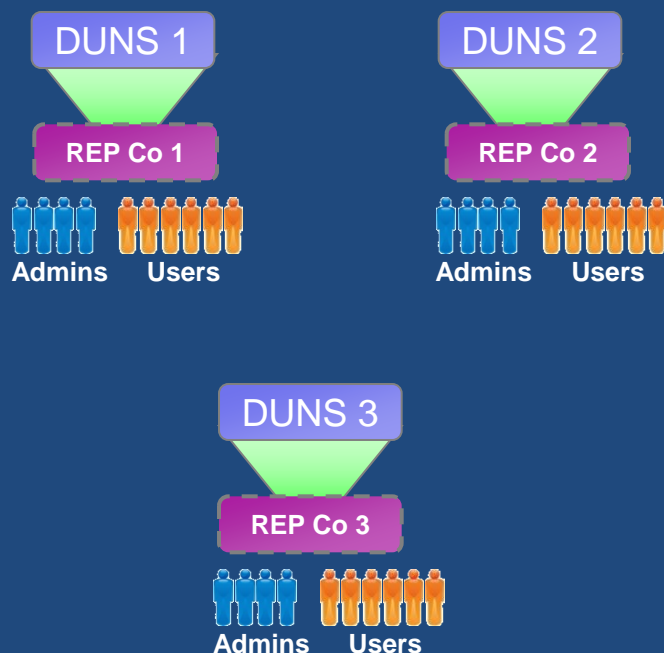/ Administration

SMT Business Information for REPs

- REP Companies that operate with multiple DUNS must first decide on setup method (description of setup methods on pages following)

  1) One REP company for each DUNS
  2) Multiple DUNS associated with a single REP company
  3) Mixture of both scenarios 1 & 2 above

- The basis for the decision is centered around how the REPs conduct business and is a matter of choice for each REP.

- ✪ Switching from one method to another after setup should be avoided as it will require many of the REP's employees to re-register using a different User ID.

SMT Business Information for REPs

Registering as one REP Company for each DUNS

DUNS 1

REP Co 1

Admins   Users

DUNS 2

REP Co 2

Admins   Users

DUNS 3

REP Co 3

Admins   Users

➤ Up to four (4) Administrators per REP Company.

➤ REP Company Name <u>must</u> be unique within SMT – each DUNS must be designated in SMT by a unique Company Name.

➤ A registered User or Administrator account can only be associated with a single REP Company.

➤ You would need multiple accounts if you need to access meters associated with different DUNS numbers.

➤ You can generate single reports containing data for multiple meters as long as all of the meters are associated with the same DUNS number for REP of Record.
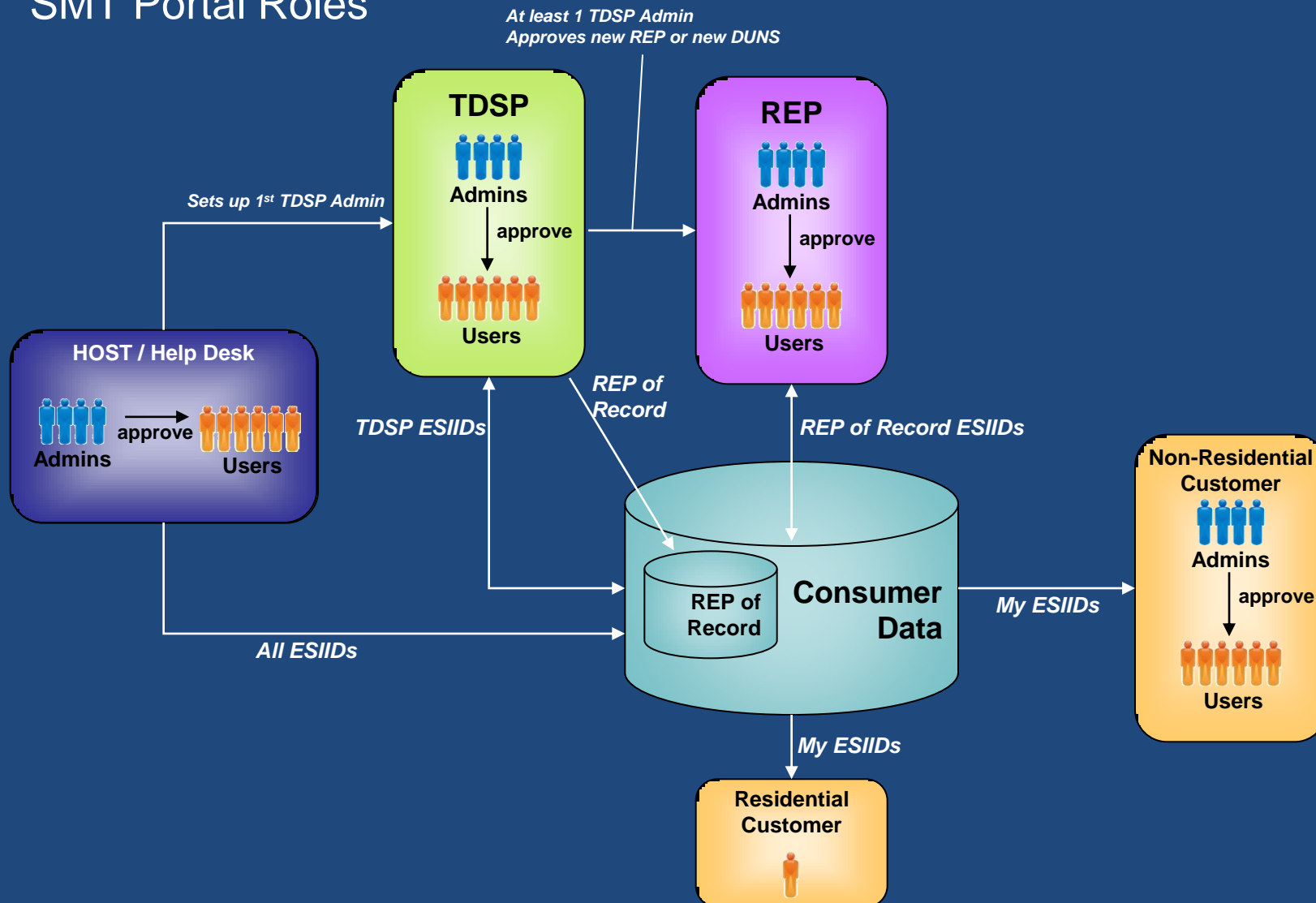
✪ When 3rd Party functionality is incorporated, REPs will be listed as available 3rd Parties by REP Company Name, as registered in SMT. In this scenario, each of the separate REP Companies will be displayed in the 3rd Party list.

SMT Business Information for REPs

Registering as one REP Company for all DUNS
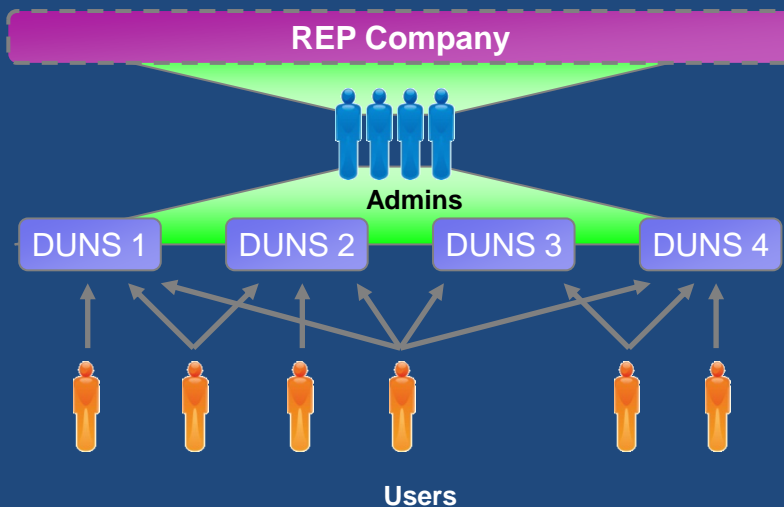
REP Company

Admins

| DUNS 1 | DUNS 2 | DUNS 3 | DUNS 4 |

Users

✪ When 3rd Party functionality is incorporated, REPs will be listed as available 3rd Parties by REP Company Name, as registered in SMT. In this scenario, only one REP Company will be displayed in the 3rd Party list.

➤ Up to four (4) Administrators total for your REP Company.

➤ In SMT, the same REP Company Name will be used for <u>all</u> of the associated DUNS.

➤ All four (4) Administrators will have access to meters associated with any of the established DUNS numbers.

➤ Your Administrators can control which of these DUNS to associate with User accounts for your Company.

➤ REP Users will only be able to access meters if they are associated with the DUNS that is the current REP of Record.

➤ REP Users can see, but not change, which DUNS numbers are associated with their account.

➤ REP Users and Administrators can generate single reports containing data for multiple meters regardless of which DUNS number the meters are associated with.

➤ Daily automated REP data files that are retrieved via ftp are always split by DUNS number and are unaffected by the way the REP Company is established in SMT.

SMT Business Information for REPs

SMT Portal Roles

At least 1 TDSP Admin Approves new REP or new DUNS

TDSP
Admins
approve
Users

REP
Admins
approve
Users

Sets up 1st TDSP Admin

HOST / Help Desk
Admins approve Users

TDSP ESIIDs

REP of Record

REP of Record ESIIDs

Non-Residential Customer
Admins
approve
Users

REP of Record **Consumer Data**

My ESIIDs

All ESIIDs

My ESIIDs

Residential Customer

SMT Business Information for REPs

- Registration with SMT covers the entire state of Texas
  - REPs will have access to all of their customers' SMT Smart Meters across a DUNS, regardless of which TDSP owns the meter

- Each REP Company will need the following information to register for SMT access*:
  - Company Profile information (contact info may be visible to REP's customers)
    - Company Name
    - Company Address (2 address lines, city, state, country, zip)
    - Company Phone (customer service number)
    - Company Email (customer service email address)
    - One or more DUNS numbers to be associated with this REP Company
  - Personal Profile information for 1st Administrator (visible only to Host & TDSPs)
    - Name (First name, middle initial, last name, suffix – only first & last name are required)
    - Phone (optional)
    - Email (required for SMT contact – will not be shared)
    - User ID (note that User IDs must be unique and cannot be reused after deletion)
  - A Form is being created that can be used by the REPs to facilitate collecting the appropriate information

* Completing this registration will allow the REP to have adhoc access to their data via the SMT online website.

SMT Business Information for REPs

- New REP Company (or addition of a DUNS to an existing REP Company) must be approved by one of the TDSP Administrators

- Other REP Administrators and Users may register for access to the existing REP Company and will be approved by the REP Administrator
  - New registrants need to be able to locate the REP Company by company name and provide their Personal Profile information

- Users vs. Administrators
  - Users can …
    - Update their own personal profile
    - View their company profile
    - Access usage data for the DUNS associated to their account
    - Add and Remove HAN Devices for the DUNS associated to their account
  - Administrators can …
    - Update their own personal profile
    - Update the company profile, including Add/Remove DUNS
    - Access usage data for all DUNS associated with the REP Company
    - Add and Remove HAN Devices for all DUNS associated with the REP Company
    - Approve/Decline new Administrator/User registration requests
    - Suspend/Reinstate/Revoke User ID access within the REP Company

SMT Business Information for REPs

- REP Customer Service

  - REP Screens and Customer screens differ in the portal.

  - REPs will be given 4 Customer Service User IDs.
    - Residential Customer – English
    - Residential Customer – Spanish
    - Non-Residential Customer – Admin
    - Non-Residential Customer – User

  - These User IDs will be associated with fictitious ESIIDs and will have representative Usage data available.

  - This allows REPs to login as a customer and see the same screens that the customer sees, though the data will differ for the customer.

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FTPS Preparation for Usage

SMT Technical Information required from REPs*

Usage Download Technical Setup Overview

Testing

| Obtain ftps Client Security Certificate (self signed) | ····▶ | Provide Public PGP Key to SMT (self signed) | ····▶ | Obtain Credentials And Addresses For SMT Staging Env. | ····▶ | Coordinate Download Testing With SMT |

⬇

Register on Portal

⬇

Production

| Obtain ftps Client Security Certificate (from Verisign) | ····▶ | Provide Public PGP Key to SMT (self signed) | ····▶ | Obtain Credentials And Addresses For SMT Production | ····▶ | Exercise Production Usage Downloads |

Allow 1-2 weeks

AEP
CenterPoint Energy
ONCOR
TNMP

* Completing this setup will allow REPs to retrieve their daily usage files via ftps.

SMT Technical Information required from REPs

REP instruction:

1) Select an FTPS-capable client

2) Obtain REP FTP user ID and password from SMT Operations Obtain and install FTPS Client certificate from VeriSign, per FTPS-client instructions. [FTPS-specific]

3) Generate PGP key pair

4) Provide PGP public key and REP SSL public certificate to SMT host administrators

5) Configure client if applicable with FTP user ID for SMT login

6) Obtain SMT server address and configure client for connection setup

7) Access FTPS server – enter FTP User ID and password to authenticate, to start. The FTPS client will then use the certificate with the FTPS server to establish an encrypted SSL session.

SMT (M1) FTPS Interface Overview
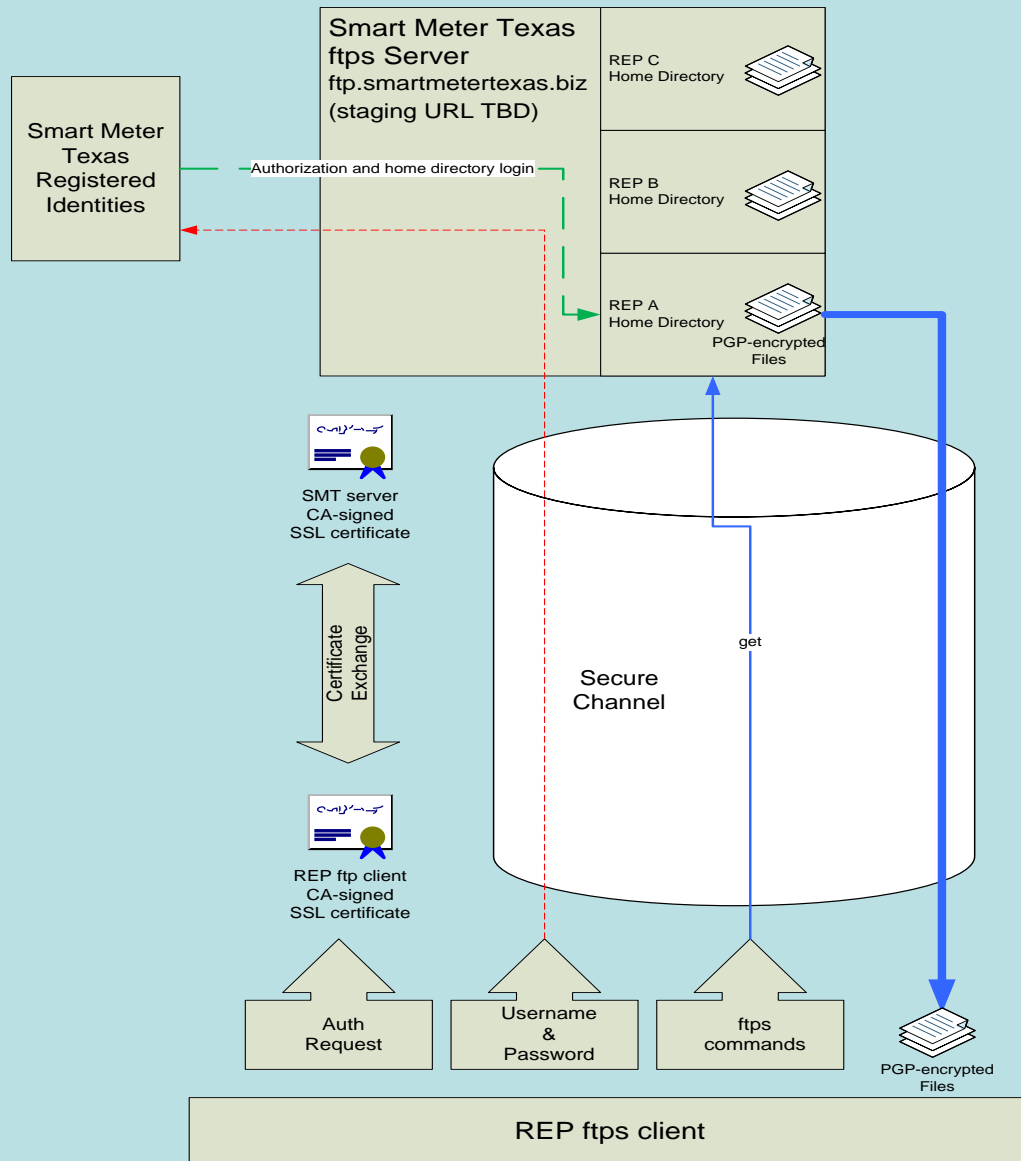
Example ftps Connection (Core FTP LE)

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M1 Ad hoc Usage API

SMT Technical Information required from REPs*

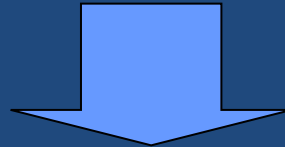## Web Service Technical Setup Overview

Testing

| Generate Server X.509 Certificate (self signed) | → | Generate Certificate for WS-Security Digital Signature | → | Obtain Credentials And Addresses For SMT Staging Env. | → | Coordinate Web Service Handshake Testing With SMT |

Production

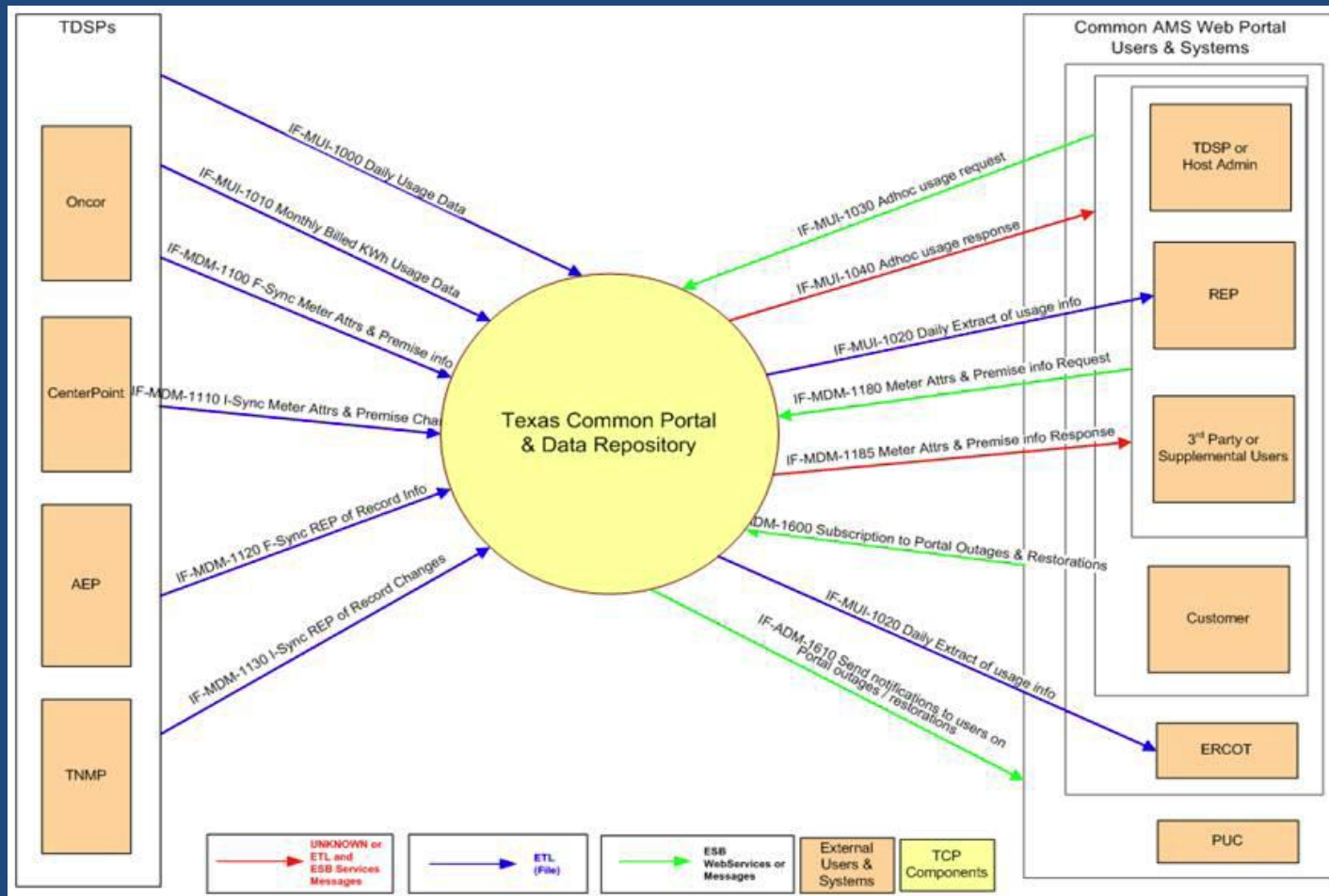| Obtain Server X.509 Certificate (from Verisign) | → | Obtain Certificate for WS-Security Digital Signature | → | Obtain Credentials And Addresses For SMT Production WS Host | → | Call Production SMT Web Services |

Allow 2-4 weeks

* Completing this setup will allow REPs to use the SMT APIs.

M1 Systems Context Diagram

Smart Meter Texas

Interface Number	Interface Description	Source	Destination	Interface Type (File, DB, Messaging, RPC, etc.)	Real time/ Batch
IF--1000	Send meter usage data with 15 minutes interval and daily register read	TDSPs	Smart Meter Texas Portal	File	Batch
IF--1010	Send meter monthly billed usage data	TDSPs	Smart Meter Texas Portal	File	Batch
IF--1020	Send daily extract of usage info since the last extract for all usage data of the of Record's ESIIDs	Smart Meter Texas Portal	REPs	File	Batch
IF--1030	**Send ad-hoc queries/request to get meter usage data with specific date range, usage data interval and one or multiple ESIIDs**	**REPs TDSPs Customers**	**Smart Meter Texas Portal**	**Web service**	**Real-time**
IF--1040	**Meter usage data response to ad-hoc queries for specific date range, usage data interval and one or multiple ESIIDs**	**Smart Meter Texas Portal**	**REPs TDSPs Customers**	**Web service / File**	**Real-time /Batch**
IF--1100	Full Sync of Meter attributes (Non-Usage Data)	TDSPs	Smart Meter Texas Portal	File	Batch
IF--1110	Incremental Sync of meter attributes (Non-Usage Data) changes	TDSPs	Smart Meter Texas Portal	File	Batch
IF--1120	Full Sync of Rep of Record	TDSPs	Smart Meter Texas Portal	File	Batch
IF--1130	Incremental Sync of Rep of Record changes to update data repository with the relationship (new, switch or move out)	TDSPs	Smart Meter Texas Portal	File	Batch
IF--1140	Full Sync of Premise Info	TDSPs	Smart Meter Texas Portal	Web service / File	Real-time / Batch
IF--1150	Incremental Sync of Premise Info	TDSPs	Smart Meter Texas Portal	Web service / File	Real-time / Batch

M1 Ad Hoc Query Overview

- Invokes an ad hoc Meter Usage Web service directly to retrieve usage information for a given UserID, ESI IDs, supplied date, reportFormat (CSV or MARS) and reportType (Daily Register read or 15 minutes interval read or Both) parameters
- For small volumes (One input ESI ID and up to 40 days of usage data)
  - ESB fetches data from the SMT data repository and writes the output to a CSV file in a shared folder
  - ESB then responds to the synchronous Web service request and returns the file URL in the SOAP response message
- For Medium volumes (One input ESI ID and usage data greater than 40 days but less than 13 months)
  - ESB submits an asynchronous request
  - ESB returns the SOAP response to the portal with the correlationId, statusCode and statusMessage
- For large volumes (More than one ESI ID)
  - ESB submits an asynchronous request
  - ESB returns the SOAP response to the portal with the correlationId, statusCode and statusMessage

Ad Hoc Query Samples – One ESIID

Request – One ESIID

```
<soapenv:Envelope
    xmlns:soapenv="http://schemas.xmlsoap.org/soap/env
    elope/"
    xmlns:met="http://schemas.esb.ams.com/meterusages
    ource">
  <soapenv:Header/>
  <soapenv:Body>
    <met:processMeterUsage>
      <MeterUsageReqList>
        <userId>JONBREZON</userId>
        <userType>RES</userType>
        <reportTypeArray>
          <!--Zero or more repetitions:-->
          <reportTypeArray>
            <reportType>INTERVAL</reportType>
            <startDate>12/04/2009</startDate>
            <endDate>12/05/2009</endDate>
          </reportTypeArray>
        </reportTypeArray>
        <!--Optional:-->
        <reportFormat>CSV</reportFormat>
        <ESIIDArray>
          <!--1 or more repetitions:-->
          <ESIID>1008901001102496160100</ESIID>
        </ESIIDArray>
      </MeterUsageReqList>
    </met:processMeterUsage>
  </soapenv:Body>
</soapenv:Envelope>
```

Response:

```
<soapenv:Envelope
    xmlns:soapenv="http://schemas.xmlsoap.org/soap/env
    elope/"
    xmlns:soapenc="http://schemas.xmlsoap.org/soap/enc
    oding/"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-
    instance">
  <soapenv:Header/>
  <soapenv:Body>
    <me:processMeterUsageResponse
      xmlns:me="http://schemas.esb.ams.com/meterusageso
      urce">
    <MeterUsageResponse>
      <fileUrl>

      <fileUrl>/data/AdhocMeterUsage/ETL/Target/IntervalM
      eterUsage95fd7afcb176a6cb7afafac4.CSV.957877905</f
      ileUrl>
      </fileUrl>
    </MeterUsageResponse>
    <MeterUsageSOAPResponse xsi:nil="true"/>
    </me:processMeterUsageResponse>
  </soapenv:Body>
</soapenv:Envelope>
```

Ad Hoc Query Samples – Multiple ESIIDs

Request – Multiple ESIIDs

```
<soapenv:Envelope
    xmlns:soapenv="http://schemas.xmlsoap.org/soap/
    envelope/"  xmlns:met="http://schemas.esb.ams.com/
    meterusagesource">
 <soapenv:Header/>
 <soapenv:Body>
  <met:processMeterUsage>
    <MeterUsageReqList>
     <userId>JONBREZON</userId>
     <userType>RES</userType>
     <reportTypeArray>
       <!--Zero or more repetitions:-->
       <reportTypeArray>
         <reportType>INTERVAL</reportType>
         <startDate>12/04/2009</startDate>
         <endDate>12/05/2009</endDate>
       </reportTypeArray>
     </reportTypeArray>
     <!--Optional:-->
     <reportFormat>CSV</reportFormat>
     <ESIIDArray>
       <!--1 or more repetitions:-->
       <ESIID>1008901001102496160100</ESIID>
       <ESIID>1008901002100782200100</ESIID>
     </ESIIDArray>
    </MeterUsageReqList>
  </met:processMeterUsage>
 </soapenv:Body>
</soapenv:Envelope>
```

Response:

```
<soapenv:Envelope
    xmlns:soapenv="http://schemas.xmlsoap.org/soap/
    envelope/"
    xmlns:soapenc="http://schemas.xmlsoap.org/
    soap/encoding/"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-
    instance">
 <soapenv:Header/>
 <soapenv:Body>
  <me:processMeterUsageResponse
    xmlns:me="http://schemas.esb.ams.com/meterusageso
    urce">
   <MeterUsageResponse xsi:nil="true"/>
   <MeterUsageSOAPResponse>
   <correlationId>47c765fdccbab4c36399d7ab
     </correlationId>
    <statusCode>0</statusCode>
    <statusMessage>Data record completed
   successfully</statusMessage>
   </MeterUsageSOAPResponse>
  </me:processMeterUsageResponse>
 </soapenv:Body>
</soapenv:Envelope>
```

M1 Ad Hoc Query Security

- M1 APIs use mutual authentication over SSL

- Two kinds of security tokens can be used for authentication
  - Username or SAML tokens
    - It is assumed that REPs will use Username tokens

- Validations
  - Token data is used to map the sender of a request to a system account
  - System account is authorized to access data related to a DUNs number
  - WS-Security signature used to verify the request sender and determine request integrity

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HAN API

HAN API Assumptions

Interface Message Description	Response	Invocation Type
Provisioning Device Request	Provision Request Acknowledgement	
De-provisioning Device Request	Provision Request Acknowledgement	
Simple Messaging Request	Messaging Request Acknowledgement	
Cancel Simple Message Request	Messaging Request Acknowledgement	Synchronous
Load Control Messaging Request	Messaging Request Acknowledgement	
Cancel Load Control Message Request	Messaging Request Acknowledgement	
Cancel All Load Control Message Request	Messaging Request Acknowledgement	
Price Signal Request	Messaging Request Acknowledgement	

Status concerning requests is available via the SMT Portal.

Smart Meter Texas (SMT) Portal
HAN Integration Interfaces
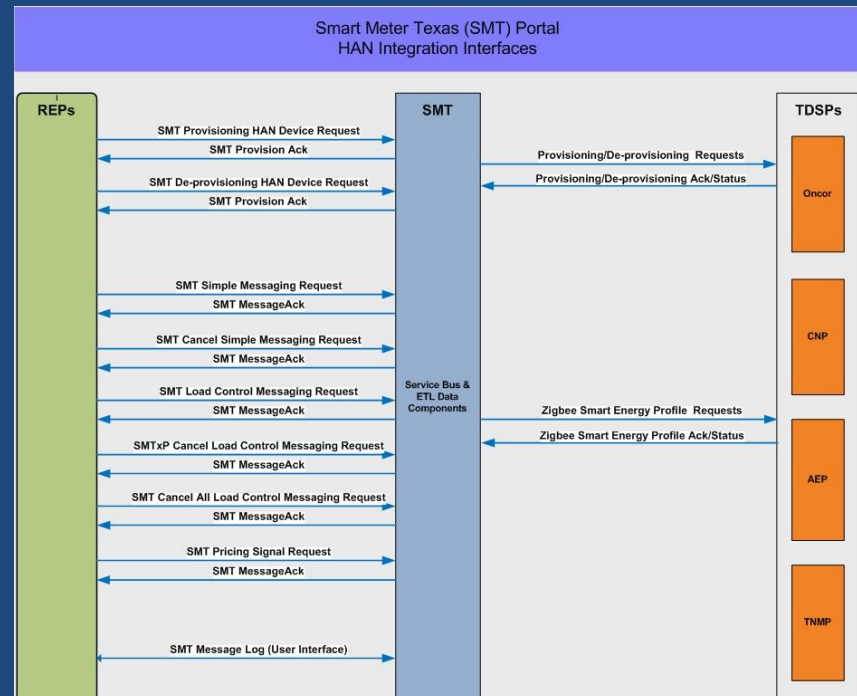
HAN API Example

- Soap envelope

- Soap header
  - Contains the authentication token

- Soap body (SMT request)
  - SMT request identifier
  - SMT header information
  - SMT address block
    - Only used for SEP messages
  - SMT request body

```xml
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
        xmlns:smt="http://schemas.esb.ams.com/smtxpmessaging">
 <soapenv:Header>
  <wsse:Security xmlns:wsse=
   "http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-secext-
    1.0.xsd">
  <wsse:UsernameToken>
   <wsse:Username>REP_Sytem_Account</wsse:Username>
  </wsse:UsernameToken>
  </wsse:Security>
 </soapenv:Header>
 <soapenv:Body>
   <smt:processCancelAllLCEvents>
    <SMTxPCancelAllLoadControlEventRequest>
     <!--Optional  RequestID removed -->
     <RequesterType>0</RequesterType>
     <RequesterAuthenticationID>111111111</RequesterAuthenticationID>
     <RequesterID> HAN_REP2_ADMIN </RequesterID>
     <RequestPriority>L</RequestPriority>
     <!--Optional: CallbackUri removed -->
     <AddressBlock>
      <!--Optional: GroupID removed -->
      <AddressList>
       <!--0 to 10000 repetitions:-->
       <Address>
        <ESIID>00000000000000001</ESIID>
        <MeterSerialNumber>00000000000000098</MeterSerialNumber>
       </Address>
      </AddressList>
     </AddressBlock>
     <CancelAllLCEventMessageBlock>
      <CancelControl>0</CancelControl>
     </CancelAllLCEventMessageBlock>
    </SMTxPCancelAllLoadControlEventRequest>
   </smt:processCancelAllLCEvents>
 </soapenv:Body>
</soapenv:Envelope>
```

HAN API Assumptions

- Only 1 device can be provisioned or de-provisioned per request

- No more than 10,000 addresses* can be sent a SEP message

- Central time is used for all timestamps input to the API

* An addressable unit can be an ESIID/meter or an individual device.

HAN API Security

- HAN APIs must use mutual authentication over SSL
- Two kinds of security tokens can be used for authentication
  - Username or SAML tokens
    - It is assumed that REPs will use Username tokens
- Validations
  - Token data is used to map the sender of a request to a system account
  - System account is authorized to access data related to a DUNs number
  - WS-Security signature used to verify the request sender and determine request integrity

- **Username token**

```
<soapenv:Header>
  <wsse:Security xmlns:wsse=
  "http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-
      wssecurity-secext-1.0.xsd">
    <wsse:UsernameToken>
      <wsse:Username>REP_Sytem_Account
      </wsse:Username>
    </wsse:UsernameToken>
  </wsse:Security>
</soapenv:Header>
```

- **SAML token**

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Schedule for REP Roll-out

REP Roll-out Plan

- Key Dates

  - Dec 14   SMT DRAFT Interface Specs released (FTPS and API)
  - Dec 14   HAN DRAFT API Interface Specs released
  - Jan 7   SMT and HAN Technical Session on FTPS set-up and API
  - Jan 15   FINAL SMT and HAN Interface Specs released
  - Jan 20   SMT and HAN Detailed REP Orientation
  - Jan 31   SMT and HAN go-live

  - Feb 1   REPs can set up their REP entity, admins, and users in SMT
  - Feb   Weekly technical conference calls to address questions regarding FTPS set-up
  - Feb/Mar Scheduled (per PUCT sign-up) sessions to set-up and test FTPS and HAN API interfaces (limited number of REPs per session)

Thank You For The Opportunity To Discuss

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